

IN THE SPECIFICATION:

**Please replace the paragraph after the heading CROSS-REFERENCE TO RELATED APPLICATIONS with the following:**

This application is a continuation of U.S. Patent Application Serial No. 09/033,514, filed March 2, 1998, which is a continuation of U.S. Patent Application Serial No. 08/680,292, filed July 12, 1996, which issued as U.S. Patent No. 5,942,157, both of which are and is incorporated herein by reference in its their entirety.

**Please replace the paragraph beginning on page 15, line 22 and ending on page 16, line 13 with the following:**

The second phase material of choice for use in the practice of the present invention is a liquid crystal. This also allows an electro-optical response for the resulting hologram. The concentration of LC employed should be large enough to allow a significant phase separation to occur in the cured sample, but not so large as to make the sample opaque or very hazy. Below about 20% by weight very little phase separation occurs and diffraction efficiencies are low. Above about 35% by weight, the sample becomes highly scattering, reducing both diffraction efficiency and transmission. Samples fabricated with approximately 25% by weight typically yield good diffraction efficiency and optical clarity. In prepolymer mixtures utilizing a surfactant, the concentration of LC may be increased to 35% by weight without loss in optical performance by adjusting the quantity of surfactant. Suitable liquid crystals contemplated for use in the practice of the present invention include the mixture of cyanobiphenyls marketed as E7 by Merck, 4'-n-pentyl-4-cyanobiphenyl, 4'-n-heptyl-4-cyanobiphenyl, 4'-

octaoxy-4-cyano biphenyl, 4'-pentyl 4-cyanoterphenyl, 4-methoxybenzylidene-4'-butylaniline, and the like. Other second phase components are also possible.

**Please replace the paragraph after the heading ABSTRACT with the following:**

A new photopolymerizable material allows single-step, fast recording of volume holograms with properties that can be electrically controlled. Polymer-dispersed liquid crystals (PDLCs) in accordance with the invention preferably comprise a homogeneous mixture of a nematic liquid crystal and a multifunctional pentaacrylate monomer, in combination with photoinitiator, coinitiator and cross-linking agent. Optionally, a surfactant such as octanoic acid may also be added. The PDLC material is exposed to coherent light to produce an interference pattern inside the material. Photopolymerization of the new PDLC material produces a hologram of clearly separated liquid crystal domains and cured polymer domains. Volume transmission gratings made with the new PDLC material can be electrically switched between nearly 100% diffraction efficiency and nearly 0% diffraction efficiency. By increasing the frequency of the switching voltage, switching voltages in the range of 50 Vrms can be achieved. ~~The optional use of surfactant allows low switching voltages at lower frequencies than without surfactant. In an alternative embodiment, a PDLC material in accordance with the invention can be utilized to form reflection gratings, including switchable reflection gratings. In still further embodiments, a PDLC material in accordance with the invention can be used to form switchable subwavelength gratings. By further processing, static transmission reflection, and subwavelength PDLC materials can be formed.~~